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## C-A OPERATIONS PROCEDURES MANUAL

### 9.3.1 Procedure for Reviewing Conventional Safety Aspects of a C-A System

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#### Hand Processed Changes

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Approved: Signature on File  
 Collider-Accelerator Department Chairman      Date

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### 9.3.1 Procedure for Reviewing Conventional Safety Aspects of a C-A System

#### 1. Purpose

- 1.1 The C-A Accelerator Systems Safety Review Committee's (ASSRC) job is to review conventional safety aspects and hazard control of C-A systems. This procedure provides instructions for C-A Group Leaders to evaluate which new and modified C-A systems require a review by the ASSRC. This procedure also provides instructions for ASSRC members, Line Managers, and designated Project Engineers and Project Physicists for reviewing new and modified C-A systems. Feedback on review items is provided through "Action Items."
- 1.2 Definitions
  - 1.2.1 C-A Group Leaders are Line Managers of projects (e.g.: Head Electrical Systems, Group Leader Preinjectors, etc.).
  - 1.2.2 Project is any proposed new or modified equipment or system that fits the profile established in Section 3.1 of this procedure.
  - 1.2.3 The Chair of the C-A Accelerator Systems Safety Review Committee is equivalent to the term Experiment Review Coordinator as used in the [Work Planning and Control for Experiments and Operations](#) Subject Area.
  - 1.2.4 Project Engineer or Physicist is the lead person who interfaces with the ASSRC; for example, in preparing documents for ASSRC review, obtaining hazard analyses or in closing out Action Items. The Project Engineer or Physicist is the C-A Department equivalent to a combination of the Experiment Review Coordinator and Lead Experimenter as used in the [Work Planning and Control for Experiments and Operations](#).
  - 1.2.5 Action Items provide assurance to the ASSRC Chair and the C-A Associate Chair for ESHQ that feedback and "lessons learned" from review process are acted on to completion. Completion of items is not required for start-up of a specific project. They relate to long-term improvements to the accelerator and its processes as required in the [Work Planning and Control for Experiments and Operations](#) Subject Area. (See also [C-A OPM 9.3.2](#)).

#### 2. Responsibilities

- 2.1 The C-A Group Leaders (e.g.: Head Electrical Systems, Group Leader Preinjectors, etc.) shall

- 2.1.1 Ensure that projects whose design specification include equipment or systems fitting the profile for ESH reviews as stated in Section 3.1 are referred to the ASSRC for review by notifying the ASSRC Committee Chair.
- 2.1.2 Assign the Project Engineer or Physicist and ensure that he or she reads and understands [C-A OPM 9.3.1](#) and [C-A OPM 9.3.2](#) plus their Attachments.

**Note:**

If requested, Chief Engineers shall certify a device as per requirements in [C-A-OPM 9.2.3](#), Procedure for Chief Engineers to Certify Conformance of Devices.

- 2.2 The Project Engineer or Physicist shall:
  - 2.2.1 Analyze the hazards associated with the project as outlined in this procedure.
  - 2.2.2 Initially present the project to the AARC Chair, with a written description of the project, and a completed [C-A Hazard Identification Tool](#). A copy of the [C-A Hazard Identification Tool](#), along with information required to mitigate any hazards, is to be submitted to the ESHQ Division Head. The C-A ESHQ Division Head shall review the documents and make recommendations to the ASSRC Chair, if a review by the ASSRC Committee is warranted.
  - 2.2.3 Act as the Line Manager's designated representative on matters related to the project and its conformance to ESH requirements.
  - 2.2.4 Assist the Committee on the resolution of Committee concerns and comments and ensure compliance with all BNL requirements in the [Standards Based Management System](#).
  - 2.2.5 Ensure sign-off of all items that must be closed out before start of operations, or sub-systems operation on the ASSRC Check-Off List. See [C-A-OPM 9.3.2](#).
- 2.3 The ASSRC Chair shall
  - 2.3.1 The ASSRC Chair, if required at their discretion, will schedule a review by the full, or partial, ASSRC Committee, and shall have the Project Engineer or Physicist make a formal presentation.
  - 2.3.2 Write, or delegate the writing of, the minutes of Committee meetings, including details of comments and concerns.

- 2.3.3 Write or delegate the writing of, the minutes of Committee walk-throughs, list those items that must be included in the ASSRC Check-off List.
- 2.3.4 Ensure that subject matter expert(s); that is, those familiar with the particular safety issues presented by the system under review, are present at the system design review meeting and walkthrough. The ASSRC Chair may deputize an outside expert to be a member for a specific meeting if the corresponding committee expert is not present.
- 2.4 The C-A Department Chairman, or his designee shall approve start of operations of new or modified systems or sub-systems.
- 2.5 The C-A ESHQ Division Head, or ESH Coordinator, shall review completed C-A Hazard Identification Tool Documentation. Recommendations, of the type of ASSRC reviews required for the project, shall be submitted to the ASSRC.
  - 2.5.1 The C-A ESHQ Division Head shall review, and when appropriate, complete the [Checklist for Identifying Issues/Decisions that May Require Community Involvement](#). The checklist shall be submitted to the Community Involvement Office.
- 2.6 The C-A ASSRC shall perform two types of reviews:
  - 2.6.1 Review projects and/or systems when they near the procurement phase
  - 2.6.2 Perform an "as installed" walk-through before initial startup to assure the hazards are controlled, or will be, after Check-Off List in [C-A-OPM 9.3.2](#) is completed.

### 3. Prerequisites

- 3.1 C-A Systems that are Subject to Committee Review:
  - 3.1.1 C-A systems, projects or equipment with an A1 (critical) or A2 (major) Quality Classification shall be reviewed, if no classification currently exists, then the appropriate Chief Engineer and Department QA Representative shall assign a classification code to the system.
  - 3.1.2 New equipment, which if it fails, could cause more than \$100,000 in damage, or more than three weeks of C-A program loss.
  - 3.1.3 C-A systems that have the potential for "High Hazard", or "Moderate Hazard", as defined in [Examples of Low, Moderate and High Tasks](#) from the [Work Planning and Control for Experiments and Operations](#) Subject Area, or by the C-A Hazard Identification Tool.

- 3.1.4 Conventional aspects of experiments referred to the Committee for review by the Chair of the Experimental Safety Review Committee.
- 3.1.5 Modifications to existing C-A systems or equipment, which are classified as A1 or A2, and which will introduce a previously absent hazard as listed in Section 5.4, or which will after modification contain High Hazard items.
- 3.1.6 Any system, project or equipment referred for review by the C-A Associate Chair for ESHQ, the C-A ESHQ Division Head, or any ASSRC Member.
- 3.2 Training:
  - 3.2.1 Members of the C-A ASSRC shall read and understand the duties required of them in this procedure. In addition, be knowledgeable as to the nature and hazards typically found in C-A systems.
  - 3.2.2 C-A Group Leaders shall read and understand the duties required of them in Sections 2.1 and 3.1 of this procedure.
  - 3.2.3 Project Engineer or Physicist shall read and understand the duties required of them in this procedure, and use of the [C-A Hazard Identification Tool](#).
- 3.3 The designated Project Engineer or Physicist must analyze the hazards using this procedure and good practices given in [C-A OPM ATT 9.3.1.a](#).
- 3.4 The designated Project Engineer or Physicist must provide written descriptions of the safety issues and appropriate diagrams of protective systems including a completed analysis from the [C-A Hazard Identification Tool](#), to alert the committee as to what type of subject matter experts may be needed at the review meeting. This material must be given to the C-A ASSRC Chair for distribution before the scheduling of a review.
- 3.5 C-A ASSRC formal meeting shall be considered to be in session when four or more of the current members attend and the necessary safety-issues experts are present.
- 3.6 A subcommittee of three or more members may perform a walk-through review with the required experts designated by the Committee Chair.

#### **4. Precautions**

- 4.1 New or modified C-A systems shall not operate or change parameters outside of their approved envelope until satisfactory review by the Committee, and the designated Project Engineer or Physicist fulfills or resolves all Committee concerns.
- 4.2 Formal release of a new or modified system by the Committee is required.
- 4.3 Where applicable, the designated Project Engineer or Physicist, in consultation with the Associate Chair for ESHQ, shall also ensure all necessary NEPA and DOE Accelerator Safety Order 420.2 requirements are met prior to the design of a new facility or structure, including:
  - 4.3.1 Safety Assessment Document and Accelerator Safety Envelope or modification to existing.
  - 4.3.2 National Environmental Policy Act (NEPA) Assessment or Environmental Impact Statement, or a request for Categorical Exclusion.
- 4.4 The Project Engineer or Physicist shall ensure that all BNL requirements in the [Standards Based Management System](#) are met prior to occupancy or operation of a new facility or structure.
  - 4.4.1 This may include a Accelerator Readiness Review, Operational Readiness Evaluation (ORE), and/or a Beneficial Occupancy Readiness Evaluation (BORE).
  - 4.4.2 The C-A Associate Chair for ESHQ, or designee, will assist the designated Project Engineer or Physicist in order to determine if these additional requirements apply.

#### **5. Procedure**

- 5.1 After delivering material described in Section 3.4 to the Chair ASSRC, the designated Project Engineer or Physicist shall obtain a meeting date of the C-A Accelerator Systems Safety Review.
- 5.2 The Committee shall attempt to meet within 30 days after the receipt of materials for review.
- 5.3 The ASSRC Chair shall distribute meeting notices and copies of any materials provided by the designated Project Engineer or Physicist.

5.4 The C-A Accelerator Systems Safety Committee shall review the hazard analysis of the following aspects of the system:

5.4.1 [Environmental Evaluation of Industrial Processes and Experimental Research](#)

5.4.1.1 The ASSRC Chair shall request that the Environmental Compliance Representative review the following:

**Note:**

The ASSRC must document an environmental evaluation for each project in conformance with requirements in the pertinent SBMS Subject Areas. See [Collecting Industrial Process Information](#) for instructions to Project Engineer/Physicist, who are referred to as “Department Staff” in this BNL document.

5.4.1.2 Any [non-radioactive air emissions](#), [radioactive air emissions](#) or [liquid effluents](#).

5.4.1.3 Any emissions/effluents that may exceed the scope of the [AGS Environmental Assessment](#) or [RHIC Environmental Assessment](#)

5.4.1.4 Any activity requiring a [NEPA](#) review.

5.4.1.5 Any hazardous waste disposal or compliance with [C-A-OPM 8.20](#) or SBMS Subject Area [Hazardous Waste](#) requirements.

5.4.1.6 Any radioactive waste disposal or compliance with [C-A-OPM 8.20.2](#) or SBMS Subject Area [Radioactive Waste](#) requirements.

5.4.1.7 Any mixed waste disposal or compliance SBMS Subject Area [Mixed Waste](#) requirements.

5.4.1.8 Any future legacy issues, e.g. Be or High  $z$ , ( $>Fe$ ) materials.

5.4.1.9 Any use of ozone depleting chemicals such as Freon (see [C-A-OPM-ATT 9.2.1.c](#)).

5.4.1.10 Any clean waste disposal and recycling practices not in compliance with Subject Areas SBMS applicable and [C-A-OPM 8.22](#).

5.4.1.11 Any plans to install new underground or aboveground storage tanks.

- 5.4.1.12 Any plans to transfer or store hazardous materials (see SBMS [Storage and Transfer of Hazardous Materials](#)).
- 5.4.1.13 Any plans to modify or add an Operations Control Form associated with the C-A Environmental Management System. Contact the C-A Environmental Compliance Representative for more information.
- 5.4.2 [Pollution Prevention](#): All activities that involve purchasing, using or disposing of hazardous material and/or radioactive material shall be reviewed to reduce waste generation whenever possible.
  - 5.4.2.1 Consider measures to avoid or reduce the generation of hazardous substances, pollutants, wastes and contaminants at the source.
  - 5.4.2.2 Make plans to treat waste to reduce the volume, toxicity or mobility before storage or disposal.
- 5.4.3 Combustible/Flammable Materials
  - 5.4.3.1 All use of flammable gases (see [SBMS](#), [ES&H Standard 4.12.0](#), Special Precautions For Locations Containing Flammable Atmospheres and [C-A-OPM 9.2.7](#)).
  - 5.4.3.2 Any flammable liquids used in quantities exceeding 1 gallon or in any quantity if the flash point is less than 100°F (see SBMS, [ES&H Standard 4.10.2](#)).
  - 5.4.3.3 Any equipment or material containing wood, plastic, paper, or other combustible matter in significant quantities. Compliance with the Life Safety Code (see “Means-of Egress,” [ES&H Standard 4.1.2](#)).
  - 5.4.3.4 Compliance with the approved Risk level of fire protection (see [ES&H Standard 4.0.0](#)).
- 5.4.4 Hazardous Chemicals
  - 5.4.4.1 Oils or Solvents (see SBMS Subject Area “[Working With Chemicals](#)”)
  - 5.4.4.2 Biological Hazards (See [ESH Standard 2.8.0](#))
  - 5.4.4.3 Work with chemicals requires an evaluation of work practices and PPE to minimize possible exposures.



**Note:**

Prohibited Work: Grinding, milling, machining or spreading of the following substances: Beryllium, Asbestos, & PCB.

5.4.5 Electrical (see ES&H Standards [1.5.0](#), [1.5.1](#) and [1.5.2](#)).

5.4.5.1 Fusing and other protective circuitry in equipment.

5.4.5.2 Emergency-off controls for power (see [C-A-OPM-ATT 9.2.1.a](#)).

5.4.5.3 Procedures for securing power when the equipment is being worked on; i.e., lock out/tag out procedures.

5.4.5.4 Requirements for emergency power.

5.4.5.5 Exposed electrical terminals.

5.4.5.6 Working Hot permits, if required.

5.4.5.7 Assessing electrical equipment as ignition sources (SBMS, [ES&H Standard 4.12.0](#)).

5.4.5.8 Electrical design criteria that are not explicitly stated in NEC, OSHA, or the applicable Subject Areas in [SBMS](#), or in the C-A Department, ["Supplemental Electrical Safety Standard"](#).

5.4.6 Mechanical

5.4.6.1 Any material handling devices including all large moving equipment. (See [C-A-OPM 8.25, "Material Handling: Equipment & Procedures"](#) and [SBMS Lifting Safety](#)).

5.4.6.2 Structures supporting heavy loads.

5.4.6.3 All aspects of compressed gas systems; for example, types of regulators and line pressure (see [ESH Standard 1.4.1](#)).

5.4.6.4 Structures or devices influenced by a magnetic push or pull.

5.4.6.5 All vessels that are operated above or below atmospheric pressure.

5.4.6.5.1 All vessel windows (see [ESH Standard 1.4.2](#)).

- 5.4.7 Temperature, Lasers, RF (including microwave), Noise, and Magnetic Fields
- 5.4.7.1 Any equipment which has surface temperatures less than 0°F or greater than 150°F.
- 5.4.7.2 Any radio frequency or microwave radiation field generated by a source greater than 7 W (see SBMS, [ES&H Standard 2.3.2](#)) in a space that might be occupied.
- 5.4.7.3 Lasers with power greater than 1 mW (see SBMS Subject Area [Laser Safety](#), and exhibits [BNL General Laser Registration Form & Class 2/3A Use Permit](#) and [Laser Controlled Area Standard Operating Procedure](#)).
- 5.4.7.4 Equipment that generates sound pressure in excess of 85 dBA during an 8-hour work period or in excess of 80 dBA during extended work periods beyond 8 hours. (See SBMS, [ES&H Standard 2.4.0](#)).
- 5.4.7.5 Magnetic fields with fringe fields greater than 4 gauss. (See [C-A OPM-ATT 9.2.1.d](#))
- 5.4.7.6 Ultraviolet lamps.
- 5.4.8 Oxygen Deficiency Hazards. Any facility or device that presents an ODH hazard (sees [C-A-OPM 9.2.9](#), Oxygen Deficiency Hazards and Control).
- 5.4.9 Confined Space Hazards (See [C-A-OPM 8.14](#), "[Confined Space Entry Procedure](#)").
- 5.4.10 Other Committees: If the ASSRC requests a review by another committee, then it shall be noted in the minutes as a 'Concern.' The Chair of the other committee shall be requested to sign off that concerns of the ASSRC are satisfied.
- 5.4.10.1 All cryogenic devices are subject to review by the BNL Cryogenic Safety Committee (see Standards Based Management System ([SBMS](#)), Environmental Safety & Health (ES&H) Standards [5.1.0](#), [5.2.0](#), and [C-A-OPM 9.6.1](#), Cryogenic System Review.
- 5.4.10.2 Possible beam loss, shielding and access-security issues are to be reviewed by the [C-A Radiation Safety Committee](#) (RSC).

- 5.4.10.3 Upon specific recommendation by the C-A RSC or ASSRC, dose reduction efforts for any particular system are to be reviewed by the [C-A ALARA Committee](#).
- 5.4.10.4 If the accelerator modification effects experiment ESH, then the [C-A Experiment Safety Review Committee](#) shall review the concern.
- 5.4.11 Procedures (Procedures must comply with [Conduct of Operations](#) requirements)
  - 5.4.11.1 Operating procedures.
  - 5.4.11.2 Emergency procedures.
- 5.4.12 Training requirements
  - 5.4.12.1 Beyond 'Skill of the trade' for construction.
  - 5.4.12.2 Operations training.
- 5.5 The Chair will prepare and distribute meeting minutes as a BNL Memorandum, including, as appropriate, an annotated copy of the analysis from the C-A Hazard Identification Tool, to Committee Members with copies to all those who were in attendance at a review and the appropriate Division Head. Minutes will include:
  - 5.5.1 A brief description of the system.
  - 5.5.2 Action Items (see [C-A-OPM-ATT 9.3.2.a](#)) that the committee wants launched.
  - 5.5.3 A list of those present.
  - 5.5.4 Any Committee concerns that represent the formal sense of the Committee.
  - 5.5.5 Committee comments which are usually statements by individual members based upon their technical competence, and which are intended to serve as guidance to the designated project engineer or physicist.
  - 5.5.6 What other C-A committees have been asked to review.
- 5.6 When completed and ready for operation, the Project Engineer or Physicist shall obtain a walkthrough date from Chair of the C-A Accelerator Systems Safety Review Committee.

- 5.7 The Chair shall distribute meeting notices and copies of previous minutes and any materials provided by the Project Engineer or Project Physicist and appoint an ASSRC Sub-committee to do the walkthrough.
- 5.8 The C-A ASSRC Sub-committee shall review the concerns of the Committee as listed in the minutes and inspect the installation for other possible hazards.
- 5.9 Resolution of Committee “Concerns” shall be presented at the walk-through and documented in the minutes. Limits on operation during initial startup will be reviewed here. Unresolved or new concerns will be the basis of the ASSRC Check-Off List items. For feedback and improvement, Action Items shall be launched (see [C-A-OPM-ATT 9.3.2.b](#)).
- 5.10 Systems shall not be made operational, that is, under control of local operators, until all ASSRC Check-off List items are closed out and the appropriate Division Head signs the form.
- 5.11 To provide a last opportunity for feedback, the Project Engineer or Physicist, together with the ASSRC Chair, may generate an Action Item on completion of the ‘Check-Off List’.
- 5.12 The Committee Chair will supply a copy of all reports and minutes to the C-A Training and Procedure Manager for archival storage.

## **6. Documentation**

- 6.1 Committee minutes, attachments, and all reports, are to be kept with the C-A Documentation and Training Manager for archival storage.
- 6.2 Committee Reports.
- 6.3 The appropriate Chief Engineer will keep materials used during the presentation on file until completion of the project.

## **7. References**

(See section 5)

## **8. Attachments**

- 8.1 [C-A-OPM 9.3.1.a "Considerations When Designing an Accelerator for Safety"](#).